

Electronics Recycling

PBDE Emissions from Electronic Waste in WA

- No measurements taken in WA of PBDE releases to air, water, or land.
- In 2004, 7,117 tons of e-waste reported recycled.
- Expected to increase
- Unknown concentration of PBDEs.

PBDEs in computer waste (ng/g)

Homologue groups	1980 - 1984	1985- 1989	1990 - 1994	1995 - 1999	2000 - 2005
MonoBDEs	ND	52.200	ND	ND	ND
DiBDEs	0.382	119.000	0.304	0.044	0.091
TriBDEs	0.259	253.000	0.220	0.080	0.089
TetraBDEs	5.910	1,110.000	1.290	3.030	1.550
PentaBDEs	14.000	36,100.000	1.760	5.900	2.690
HexaBDEs	387.000	1,530,000.000	2.710	8.780	1.710
HeptaBDE	1,670.000	2,050,000.000	19.800	26.700	5.040
OctaBDEs	1,540.000	5,190,000.000	18.000	19.600	3.210
NonaBDEs	801.000	1,910,000.000	40.600	ND	ND
DecaBDEs	7,530.000	1,670,000.000	268.000	41.200	ND
Total BDEs	11,948.551	12,387,634.200	352.684	105.334	14.380

Key Pathways

- Multiple studies in literature identify electronics recycling facilities as point sources of PBDEs to air
- One study found that BDE-209 deposited relatively close to facility (Charles, et al., 2005).

Mass transfer coefficients of PBDEs from e-waste at a Swiss electronics recycling plant

Output Fractions	Penta-BDE 7.9 kg	Octa-BDE 121 kg	Deca-BDE 117 kg
Fine particulates	9.9%	3.0%	4.0%
Copper cables	1.2%	0.3%	0.6%
Printed circuit boards	0.8%	0.03%	0.1%
Plastics and wooded casings	3.5%	33.0%	26.2%
Fine grained plastic (0 – 10 mm)	80.9%	46.3%	65.0%
Fine grained metals	3.6%	17.3%	4.2%

Potential Risks

- Worker exposure
- Point source to air

Key Uncertainties

- Concentration of PBDEs in electronics
- How concentration will change with time
- Variability of PBDEs among brands

Potential Management Options

- If PBDEs are released to outside air from the facility
 - Install a ventilation system with a high rate of air exchange. Change filters regularly, dispose of as hazardous waste, if designates.
 - Conduct demolition in rooms with restricted access and under specific conditions to minimize the release of PBDEs during deconstruction
 - No action.

Potential Management Options

- If PBDEs pose a risk to workers
 - Install a ventilation system, as above.
 - Regularly test indoor air/dust.
 - No action.